



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
DESA/HWSB/HWSS
2890 Woodbridge Avenue, Edison, NJ 08837

EXECUTIVE NARRATIVE

Case No.: 47747

Site: Pierson's Creek

Number of Samples: 1 (Water)

Analysis: Metals (ICP-MS, MA# 2916.1) and Hg (MA# 2755.2)

SDG No.: MBE809

Laboratory: Chemtech Consulting Group

Sampling dates: 12/20/2018

Validation SOP: HW-3b and -3c (Rev 1)

QAPP

Contractor: CDM Smith

Reference: DCN: 3323-077-03593, July 30, 2018

SUMMARY OF DEFINITIONS:

Critical: Results have an unacceptable level of uncertainty and should not be used for making decisions. Data have been qualified "R" rejected.

Major: A level of uncertainty exists that may not meet the data quality objectives for the project. A bias is likely to be present in the results. Data has been qualified "J" estimated. "J+" and "J-" represent likely direction of the bias.

Minor: The level of uncertainty is acceptable. No significant bias in the data was observed.

Critical Findings:

None

Major Findings:

Metals and Hg: Sample MBE809 has analytes that have been qualified J, J+ or J-.

Minor Findings:

One or more analytes in one or more samples are qualified "J" due to results between MDL and CRQL.

COMMENT: The site specific QAPP did not provide the project action levels for samples from this site.

Reviewer Name(s): Jianwei Huang

Approver's Signature:

Date: 02/14/2019

Name: Russell Arnone

Affiliation: USEPA/R2/HWSB/HWSS



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Data Qualifier Definitions (National Functional Guidelines)			
Qualifier Symbol	Explanation		
	INORGANICS	ORGANICS	CHLORINATED DIOXIN/FURAN
U	The analyte was analyzed for, but was not detected above the level of the reported quantitation limit.	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method	The analyte was analyzed for but not detected. The value preceding the "U" may represent the adjusted Contract Required Quantitation Limit (see DLM02.X, Exhibit D, Section 1.2 and Table 2), or the sample specific estimated detection limit (EDL, see Method 8290A, Section 11.9.5).
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL).	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to an issue with the quality of the data generated because certain QC criteria were not met, or the concentration of the analyte was below the adjusted CRQL).
J+	The result is an estimated quantity, but the result may be biased high.	The result is an estimated quantity, but the result may be biased high.	
J-	The result is an estimated quantity, but the result may be biased low.	The result is an estimated quantity, but the result may be biased low.	
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.	The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.	The analyte was not detected (see definition of "U" flag, above). The reported value should be considered approximate.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
N		The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".	
NJ		The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	
C		This qualifier applies to pesticide and Aroclor results when the identification has been confirmed by Gas Chromatograph/Mass Spectrometer (GC/MS).	
X		This qualifier applies to pesticide and Aroclor results when GC/MS analysis was attempted but was unsuccessful.	



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DATA ASSESSMENT

ANALYSIS: METALS ICP-MS (MA# 2916.1)

The current SOP HW-3b (Rev 1) September 2016, USEPA Region II for the evaluation of ICP-MS metals generated through Statement of Work ISOM02.2, and any future editorial revisions of ISOM02.2 has been applied. Data have been reviewed according to TDF specifications, the National Functional Guidelines Report and the CCS Semi- Automated Screening Results Report.

1. HOLDING TIME AND PRESERVATION

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time or pH (aqueous samples are not within the acceptable range, the data may not be valid. Those analytes detected in the samples whose holding time (180 days) or pH (<2) have not been met, will be qualified as estimated, "J"; the non-detects will be flagged as unusable, "R". Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

2. CALIBRATION

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data for the metals on the Inorganic Target Analyte List (TAL). Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis.

A) INITIAL CALIBRATION

A blank and at least five calibration standards shall be used to establish each analytical curve. At least one of these standards shall be at or below the CRQL. The calibration curve shall be fitted using linear regression or weighted linear regression. The curve may be forced through zero. The curve must have a correlation coefficient ≥ 0.995 . The percent differences calculated for all of the non-zero standards must be within $\pm 30\%$ of the true value of the standard. The y-intercept of the curve must be less than the CRQL. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

B) INITIAL AND CONTINUING CALIBRATION VERIFICATION

Immediately after each system has been calibrated, the accuracy of the initial calibration must be verified and documented for each target analyte by the analysis of an ICV solution(s). The CCV standard shall be analyzed at a frequency of every two hours during an analytical run. The CCV standard shall also be analyzed at the beginning of the run, and again after the last analytical sample. The percent recovery acceptable limits for ICV/CCV are 90 – 110%. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

3. BLANK CONTAMINATION



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Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Calibration blanks (ICB and CCB) are used to ensure a stable instrument baseline before and during the analysis of analytical samples. The preparation blank is used to assess the level of contamination introduced to the analytical samples throughout the sample preparation process. Field and rinse blanks measure cross-contamination of samples during field operations. Qualifications were applied to the samples and analytes as shown below.

The following sample has analyte results less than or equal to CRQLs. The associated CCB analyte results are less than or equal to CRQLs. Detects are qualified as U. Sample results are reported at CRQLs.

Antimony, Cobalt, Copper, Lead, Silver and Thallium MBE809

4. INTERFERENCE CHECK SAMPLE

The Interference Check Sample (ICS) verifies the analytical instrument's ability to overcome interferences typical of those found in samples. The laboratory should have analyzed and reported ICS results for all elements being reported from the analytical run and for all interferents (target and non-target) for these reported elements. The ICS consists of two solutions: Solution A and Solution AB. Solution A consists of the interferents, and Solution AB consists of the analytes mixed with the interferents. Results for the analysis of ICS Solution must fall within the control limits of $\pm 20\%$ or $\pm 2X$ CRQL (whichever is greater) of the true value for the analytes and interferents included in the solution. If results that are \geq MDL are observed for analytes that are not present in the ICS solution, the possibility of false positives exists. If negative results are observed for analytes that are not present in the ICS solution, and their absolute value is \geq MDL, the possibility of false negatives in the samples exists. In general, ICP sample data can be accepted if the concentrations of Al, Ca, Fe, and Mg in the sample are found to be less than or equal to their respective concentrations in the ICS. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

5. SPIKE SAMPLE ANALYSIS

The spiked sample analysis is designed to provide information about the effect of each sample matrix on the sample preparation procedures and the measurement methodology. The spike Percent Recovery (%R) shall be within the established acceptance limits of 75 – 125%. However, spike recovery limits do not apply when the sample concentration is $\geq 4x$ the spike added. For a matrix spike analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the matrix spike sample.

No problems were found for this criterion.

6. DUPLICATE SAMPLE ANALYSIS

The objective of duplicate sample analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values \geq five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is $< 5x$ the CRQL. For a duplicate sample analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the duplicate sample.



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No problems were found for this criterion.

7. FIELD DUPLICATE

Field duplicates may be taken and analyzed as an indication of overall precision. These analyses measure both field and laboratory precision. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values \geq five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is $<$ 5x the CRQL. For field duplicates analysis that does not meet the technical criteria, the action was applied to only the field sample and it's duplicate.

No field duplicate sample was identified in this SDG.

8. LABORATORY CONTROL SAMPLE

The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Aqueous/water, soil/sediment, wipe, and filter LCSs shall be analyzed for each analyte utilizing the same sample preparations, analytical methods, and Quality Assurance/Quality Control (QA/QC) procedures as employed for the samples. All LCS Percent Recoveries (%R) must fall within the control limits of 70-130%, except for Sb and Ag which must fall within the control limits of 50-150%. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

9. ICP SERIAL DILUTION

The serial dilution of samples quantitated by Inductively Coupled Plasma determines whether or not significant physical or chemical interferences exist due to sample matrix. If the analyte concentration is sufficiently high [concentration in the original sample is $>$ 50 times (50x) the Method Detection Limit (MDL)], the Percent Difference (%D) between the original determination and the serial dilution analysis (a five-fold dilution) after correction for dilution shall be less than 10. For a serial dilution analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the serial dilution sample.

The following aqueous sample is associated with Serial Dilution (SD) sample that has analyte percent difference %D greater than 10% but less than 100%. The original sample analyte concentrations are greater than 50xMDLs. Detects are qualified as estimated J. Non-detects are not qualified.

Aluminum MBE809

10. ICP-MS TUNE ANALYSIS

The Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) tune serves as an initial demonstration of instrument stability and precision. Prior to calibration, the laboratory shall analyze or scan the ICP-MS tuning solution at least five times (5x) consecutively. The tuning solution contains 100 $\mu\text{g/L}$ of Be, Mg, Co, In, and Pb. The solution shall contain all required isotopes of the above elements. The laboratory shall make any adjustments necessary to bring peak width within the instrument manufacturer's specifications and adjust mass resolution to within 0.1 u over the range of 6-210 u. The Percent Relative Standard Deviation (%RSD) of the absolute signals for all analytes in the tuning solution must be $<$ 5%. Qualifications were applied to the samples and analytes as shown below.



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No problems were found for this criterion.

11. ICP-MS INTERNAL STANDARDS

The analysis of Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) internal standards determines the existence and magnitude of instrument drift and physical interferences. The criteria for evaluation of internal standard results apply to all analytical and Quality Control (QC) samples analyzed during the run, beginning with the calibration. All samples analyzed during a run, with the exception of the ICP-MS tune, shall contain internal standards. A minimum of five internal standards shall be added to each sample. The laboratory shall monitor the same internal standards throughout the entire analytical run and shall assign each analyte to at least one internal standard. The Percent Relative Intensity (%RI) in the sample shall fall within 60-125% of the response in the calibration blank. If the %RI of the response in the sample falls outside of these limits, the laboratory shall reanalyze the original sample at a two-fold dilution with internal standard added. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

12. PERCENT SOLIDS

The laboratory is required to perform the percent solids determination prior to sample preparation and analysis. All results of a sample with percent solids less than 50% are qualified estimated, "J". Qualifications were applied to the samples and analytes as shown below.

Not applicable.

ANALYSIS: MERCURY (MA # 2755.2)

The current SOP HW-3c (Rev 1) September 2016, USEPA Region II for the evaluation of Mercury generated through Statement of Work ISOM02.2, and any future editorial revisions of ISOM02.2 has been applied. Data have been reviewed according to TDF specifications, the National Functional Guidelines Report and the CCS Semi- Automated Screening Results Report.

1. HOLDING TIME AND PRESERVATION

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time, pH (aqueous samples), or cooler temperature are not within the acceptable range, the data may not be valid. Those analytes detected in the samples whose holding time (28 days) and pH (<2) have not been met, will be qualified as estimated, "J"; the non-detects (sample quantitation limits) will be flagged as unusable, "R". Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

2. CALIBRATION

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data for mercury. Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis.



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A) INITIAL CALIBRATION

A blank and at least five calibration standards shall be employed to establish the analytical curve. At least one of the calibration standards shall be at or below the Contract Required Quantitation Limit (CRQL). The calibration curve shall be fitted using linear regression or weighted linear regression. The curve may be forced through zero. The calibration curves for mercury shall possess a correlation coefficient of ≥ 0.995 to ensure the linearity over the calibrated range. The percent differences calculated for all of the non-zero standards must fall within $\pm 30\%$ of the true value of the standard. The y-intercept of the curve must be less than the CRQL. All sample results shall be reported from an analysis within the calibrated range. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

B) INITIAL AND CONTINUING CALIBRATION VERIFICATION

Immediately after each system has been calibrated, the accuracy of the initial calibration must be verified and documented for mercury by the analysis of an ICV solution(s). The CCV standard shall be analyzed at a frequency of every hour during an analytical run. The CCV standard shall also be analyzed at the beginning of the run, and again after the last analytical sample. The percent recovery acceptable limits for ICV/CCV are 85 – 115%. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

3. BLANK CONTAMINATION

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross-contamination of samples during field operations. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

4. SPIKE SAMPLE ANALYSIS

The spiked sample analysis is designed to provide information about the effect of each sample matrix on the sample preparation procedures and the measurement methodology. The spike Percent Recovery (%R) shall be within the established acceptance limits of 75 – 125%. However, spike recovery limits do not apply when the sample concentration is $\geq 4x$ the spike added. For a matrix spike analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the matrix spike sample.

The following sample is associated with Matrix Spike sample that has spike analyte %R within 30 - 74%. Detects are qualified as J-. Non-detects are qualified as UJ.

Mercury MBE809



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5. DUPLICATE SAMPLE ANALYSIS

The objective of duplicate sample analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. A control limit of 35% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values \geq five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is $< 5x$ the CRQL. For a duplicate sample analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the duplicate sample.

No problems were found for this criterion.

6. FIELD DUPLICATE

Field duplicates may be taken and analyzed as an indication of overall precision. These analyses measure both field and laboratory precision. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values \geq five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is $< 5x$ the CRQL. For field duplicates analysis that does not meet the technical criteria, the action was applied to only the field sample and it's duplicate.

No field duplicate sample was identified in this SDG.

7. PERCENT SOLIDS

The laboratory is required to perform the percent solids determination prior to sample preparation and analysis. Qualifications were applied to the samples and analytes as shown below.

Not applicable.

Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 47747/EPW14030/MBE809

Lab Name: Chemtech Consulting Group

Sample Number: LCS102	Method: Metals by ICP-MS	Matrix: Water	MA Number: 2916.1
Sample Location:	pH: 2	Sample Date:	Sample Time:
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Spike	37.2		ug/L	37.2		1.0	YES	S3VEM
Antimony	Spike	3.9		ug/L	3.9		1.0	YES	S3VEM
Arsenic	Spike	1.5		ug/L	1.5		1.0	YES	S3VEM
Barium	Spike	20.0		ug/L	20.0		1.0	YES	S3VEM
Beryllium	Spike	2.1		ug/L	2.1		1.0	YES	S3VEM
Cadmium	Spike	2.2		ug/L	2.2		1.0	YES	S3VEM
Calcium	Spike	897		ug/L	897		1.0	YES	S3VEM
Chromium	Spike	2.0		ug/L	2.0		1.0	YES	S3VEM
Cobalt	Spike	2.0		ug/L	2.0		1.0	YES	S3VEM
Copper	Spike	4.1		ug/L	4.1		1.0	YES	S3VEM
Iron	Spike	417		ug/L	417		1.0	YES	S3VEM
Lead	Spike	0.96		ug/L	0.96		1.0	YES	S3VEM
Magnesium	Spike	947		ug/L	947		1.0	YES	S3VEM
Manganese	Spike	1.9		ug/L	1.9		1.0	YES	S3VEM
Nickel	Spike	2.1		ug/L	2.1		1.0	YES	S3VEM
Potassium	Spike	936		ug/L	936		1.0	YES	S3VEM
Selenium	Spike	10.6		ug/L	10.6		1.0	YES	S3VEM
Silver	Spike	2.1		ug/L	2.1		1.0	YES	S3VEM
Sodium	Spike	923		ug/L	923		1.0	YES	S3VEM
Thallium	Spike	1.8		ug/L	1.8		1.0	YES	S3VEM
Vanadium	Spike	10.0		ug/L	10.0		1.0	YES	S3VEM
Zinc	Spike	3.9		ug/L	3.9		1.0	YES	S3VEM

Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 47747/EPW14030/MBE809

Lab Name: Chemtech Consulting Group

Sample Number: MBE809	Method: Mercury by Cold Vapor	Matrix: Water	MA Number: 2755.2
Sample Location: Additional Characterization of Shallow Groundwater	pH: 2	Sample Date: 12/20/2018	Sample Time: 12:30:00
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.050	UJ	ug/L	0.050	U*	1.0	YES	S3VEM

Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 47747/EPW14030/MBE809

Lab Name: Chemtech Consulting Group

Sample Number: MBE809	Method: Metals by ICP-MS	Matrix: Water	MA Number: 2916.1
Sample Location: Additional Characterization of Shallow Groundwater	pH: 2	Sample Date: 12/20/2018	Sample Time: 12:30:00
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	39.4	J	ug/L	39.4	*	1.0	YES	S3VEM
Antimony	Target	2.0	U	ug/L	0.30	J	1.0	YES	S3VEM
Arsenic	Target	68.7		ug/L	68.7		1.0	YES	S3VEM
Barium	Target	991		ug/L	991		1.0	YES	S3VEM
Beryllium	Target	1.0	U	ug/L	1.0	U	1.0	YES	S3VEM
Cadmium	Target	1.0	U	ug/L	1.0	U	1.0	YES	S3VEM
Calcium	Target	107000		ug/L	107000		1.0	YES	S3VEM
Chromium	Target	0.33	J	ug/L	0.33	J	1.0	YES	S3VEM
Cobalt	Target	1.0	U	ug/L	0.55	J	1.0	YES	S3VEM
Copper	Target	2.0	U	ug/L	0.40	J	1.0	YES	S3VEM
Iron	Target	10500		ug/L	10500		1.0	YES	S3VEM
Lead	Target	0.50	U	ug/L	0.15	J	1.0	YES	S3VEM
Magnesium	Target	13900		ug/L	13900		1.0	YES	S3VEM
Manganese	Target	393		ug/L	393		1.0	YES	S3VEM
Nickel	Target	7.0		ug/L	7.0		1.0	YES	S3VEM
Potassium	Target	20900		ug/L	20900		1.0	YES	S3VEM
Selenium	Target	3.5	J	ug/L	3.5	J	1.0	YES	S3VEM
Silver	Target	1.0	U	ug/L	0.10	J	1.0	YES	S3VEM
Sodium	Target	250000		ug/L	250000		1.0	YES	S3VEM
Thallium	Target	1.0	U	ug/L	0.050	J	1.0	YES	S3VEM
Vanadium	Target	0.43	J	ug/L	0.43	J	1.0	YES	S3VEM
Zinc	Target	46.5		ug/L	46.5		1.0	YES	S3VEM

Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 47747/EPW14030/MBE809

Lab Name: Chemtech Consulting Group

Sample Number: MBE809D

Method: Mercury by Cold Vapor

Matrix: Water

MA Number: 2755.2

Sample Location:

pH: 2

Sample Date: 12/20/2018

Sample Time: 12:30:00

% Moisture:

% Solids:

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.050	U	ug/L	0.050	U	1.0	YES	S3VEM

Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 47747/EPW14030/MBE809

Lab Name: Chemtech Consulting Group

Sample Number: MBE809D	Method: Metals by ICP-MS	Matrix: Water	MA Number: 2916.1
Sample Location:	pH: 2	Sample Date: 12/20/2018	Sample Time: 12:30:00
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	40.6		ug/L	40.6		1.0	YES	S3VEM
Antimony	Target	0.34	J	ug/L	0.34	J	1.0	YES	S3VEM
Arsenic	Target	69.6		ug/L	69.6		1.0	YES	S3VEM
Barium	Target	989		ug/L	989		1.0	YES	S3VEM
Beryllium	Target	1.0	U	ug/L	1.0	U	1.0	YES	S3VEM
Cadmium	Target	1.0	U	ug/L	1.0	U	1.0	YES	S3VEM
Calcium	Target	107000		ug/L	107000		1.0	YES	S3VEM
Chromium	Target	0.32	J	ug/L	0.32	J	1.0	YES	S3VEM
Cobalt	Target	0.51	J	ug/L	0.51	J	1.0	YES	S3VEM
Copper	Target	0.35	J	ug/L	0.35	J	1.0	YES	S3VEM
Iron	Target	10500		ug/L	10500		1.0	YES	S3VEM
Lead	Target	0.14	J	ug/L	0.14	J	1.0	YES	S3VEM
Magnesium	Target	13900		ug/L	13900		1.0	YES	S3VEM
Manganese	Target	389		ug/L	389		1.0	YES	S3VEM
Nickel	Target	6.9		ug/L	6.9		1.0	YES	S3VEM
Potassium	Target	20600		ug/L	20600		1.0	YES	S3VEM
Selenium	Target	3.5	J	ug/L	3.5	J	1.0	YES	S3VEM
Silver	Target	0.080	J	ug/L	0.080	J	1.0	YES	S3VEM
Sodium	Target	247000		ug/L	247000		1.0	YES	S3VEM
Thallium	Target	1.0	U	ug/L	1.0	U	1.0	YES	S3VEM
Vanadium	Target	0.46	J	ug/L	0.46	J	1.0	YES	S3VEM
Zinc	Target	44.1		ug/L	44.1		1.0	YES	S3VEM

Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 47747/EPW14030/MBE809

Lab Name: Chemtech Consulting Group

Sample Number: MBE809L	Method: Metals by ICP-MS	Matrix: Water	MA Number: 2916.1
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	45.2	J	ug/L	45.2	J*	5.0	YES	S3VEM
Antimony	Target	10.0	U	ug/L	10.0	U	5.0	YES	S3VEM
Arsenic	Target	67.1		ug/L	67.1		5.0	YES	S3VEM
Barium	Target	1010		ug/L	1010		5.0	YES	S3VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	5.0	YES	S3VEM
Cadmium	Target	0.25	J	ug/L	0.25	J	5.0	YES	S3VEM
Calcium	Target	108000		ug/L	108000		5.0	YES	S3VEM
Chromium	Target	0.40	J	ug/L	0.40	J	5.0	YES	S3VEM
Cobalt	Target	0.55	J	ug/L	0.55	J	5.0	YES	S3VEM
Copper	Target	0.65	J	ug/L	0.65	J	5.0	YES	S3VEM
Iron	Target	10800		ug/L	10800		5.0	YES	S3VEM
Lead	Target	2.5	U	ug/L	2.5	U	5.0	YES	S3VEM
Magnesium	Target	13800		ug/L	13800		5.0	YES	S3VEM
Manganese	Target	401		ug/L	401		5.0	YES	S3VEM
Nickel	Target	7.2		ug/L	7.2		5.0	YES	S3VEM
Potassium	Target	20800		ug/L	20800		5.0	YES	S3VEM
Selenium	Target	4.7	J	ug/L	4.7	J	5.0	YES	S3VEM
Silver	Target	0.20	J	ug/L	0.20	J	5.0	YES	S3VEM
Sodium	Target	246000		ug/L	246000		5.0	YES	S3VEM
Thallium	Target	5.0	U	ug/L	5.0	U	5.0	YES	S3VEM
Vanadium	Target	0.50	J	ug/L	0.50	J	5.0	YES	S3VEM
Zinc	Target	48.2		ug/L	48.2		5.0	YES	S3VEM

Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 47747/EPW14030/MBE809

Lab Name: Chemtech Consulting Group

Sample Number: MBE809S

Method: Mercury by Cold Vapor

Matrix: Water

MA Number: 2755.2

Sample Location:

pH: 2

Sample Date: 12/20/2018

Sample Time: 12:30:00

% Moisture:

% Solids:

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Spike	0.43		ug/L	0.43	*	1.0	YES	S3VEM

Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 47747/EPW14030/MBE809

Lab Name: Chemtech Consulting Group

Sample Number: MBE809S	Method: Metals by ICP-MS	Matrix: Water	MA Number: 2916.1
Sample Location:	pH: 2	Sample Date: 12/20/2018	Sample Time: 12:30:00
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Spike	101		ug/L	101		1.0	YES	S3VEM
Arsenic	Spike	112		ug/L	112		1.0	YES	S3VEM
Barium	Spike	3020		ug/L	3020		1.0	YES	S3VEM
Beryllium	Spike	51.0		ug/L	51.0		1.0	YES	S3VEM
Cadmium	Spike	49.6		ug/L	49.6		1.0	YES	S3VEM
Chromium	Spike	199		ug/L	199		1.0	YES	S3VEM
Cobalt	Spike	504		ug/L	504		1.0	YES	S3VEM
Copper	Spike	257		ug/L	257		1.0	YES	S3VEM
Lead	Spike	19.5		ug/L	19.5		1.0	YES	S3VEM
Manganese	Spike	873		ug/L	873		1.0	YES	S3VEM
Nickel	Spike	509		ug/L	509		1.0	YES	S3VEM
Selenium	Spike	119		ug/L	119		1.0	YES	S3VEM
Silver	Spike	45.5		ug/L	45.5		1.0	YES	S3VEM
Thallium	Spike	49.7		ug/L	49.7		1.0	YES	S3VEM
Vanadium	Spike	506		ug/L	506		1.0	YES	S3VEM
Zinc	Spike	557		ug/L	557		1.0	YES	S3VEM

Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 47747/EPW14030/MBE809

Lab Name: Chemtech Consulting Group

Sample Number: PBW102	Method: Metals by ICP-MS	Matrix: Water	MA Number: 2916.1
Sample Location:	pH: 2	Sample Date:	Sample Time:
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	20.0	U	ug/L	20.0	U	1.0	YES	S3VEM
Antimony	Target	2.0	U	ug/L	2.0	U	1.0	YES	S3VEM
Arsenic	Target	0.80	U	ug/L	0.80	U	1.0	YES	S3VEM
Barium	Target	10.0	U	ug/L	10.0	U	1.0	YES	S3VEM
Beryllium	Target	1.0	U	ug/L	1.0	U	1.0	YES	S3VEM
Cadmium	Target	1.0	U	ug/L	1.0	U	1.0	YES	S3VEM
Calcium	Target	500	U	ug/L	500	U	1.0	YES	S3VEM
Chromium	Target	1.0	U	ug/L	1.0	U	1.0	YES	S3VEM
Cobalt	Target	1.0	U	ug/L	1.0	U	1.0	YES	S3VEM
Copper	Target	2.0	U	ug/L	2.0	U	1.0	YES	S3VEM
Iron	Target	200	U	ug/L	200	U	1.0	YES	S3VEM
Lead	Target	0.50	U	ug/L	0.50	U	1.0	YES	S3VEM
Magnesium	Target	500	U	ug/L	500	U	1.0	YES	S3VEM
Manganese	Target	1.0	U	ug/L	1.0	U	1.0	YES	S3VEM
Nickel	Target	1.0	U	ug/L	1.0	U	1.0	YES	S3VEM
Potassium	Target	4.9	J	ug/L	4.9	J	1.0	YES	S3VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1.0	YES	S3VEM
Silver	Target	1.0	U	ug/L	1.0	U	1.0	YES	S3VEM
Sodium	Target	500	U	ug/L	500	U	1.0	YES	S3VEM
Thallium	Target	1.0	U	ug/L	1.0	U	1.0	YES	S3VEM
Vanadium	Target	5.0	U	ug/L	5.0	U	1.0	YES	S3VEM
Zinc	Target	2.0	U	ug/L	2.0	U	1.0	YES	S3VEM

Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 47747/EPW14030/MBE809

Lab Name: Chemtech Consulting Group

Sample Number: PBW183

Method: Mercury by Cold Vapor

Matrix: Water

MA Number: 2755.2

Sample Location:

pH: 2

Sample Date:

Sample Time:

% Moisture:

% Solids:

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.020	J	ug/L	0.020	J	1.0	YES	S3VEM

Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 47747/EPW14030/MBE809

Lab Name: Chemtech Consulting Group